

Embedded Products Reference Guide

Including MCS[®] 51/151/251, MCS[®]96/296,
Intel[®] 186, Intel386[™] and Intel486[™] Products



Embedded Intel® Architecture

INTEL 486™ PROCESSOR

PRODUCT	SPEED (MHz)	I/O PINS	SERIAL PORTS	TIMERS/ CTRS	STATIC DESIGN	SYS MGT MODE	A20 GATE	DMA CHAN	WDT	CHIP SELECT	INTERRUPT CTLR	DRAM REFRESH	CORE SPEED MULTI	CACHE	BURST DTAT BUS	INPUT LEVELS	VOLTAGE	PACKAGE	TEMP
INTEL486™ PROCESSOR FAMILY																			
80486DX4 32-bit bus	100	0	NO	0	YES	YES	NO	0	NO	0	NO	NO	3X CLK,	16Kb, WB	YES	CMOS, 5-V Tolerant	5.0V-3.3V	A168, FC208	C
80486DX2 32-bit bus	50, 66	0	NO	0	YES	YES	NO	0	NO	0	NO	NO	2X CLK	8Kb, WT	YES	CMOS	5V	A168, SB208	C
80486SX 32-bit bus	33	0	NO	0	YES	YES	NO	0	NO	0	NO	NO	N/A	8Kb, WT	YES	CMOS	5.0V-3.3V	A168, KU196	C
80486SXSf 32-bit bus	33	0	NO	0	YES	YES	NO	0	NO	0	NO	NO	N/A	8Kb, WT	YES	CMOS	3.3V	FA176	C
80486GXSf 16-bit bus	33	0	NO	0	YES	YES	NO	0	NO	0	NO	NO	N/A	8Kb, WT	YES	CMOS	3.3V	FA176	C

INTEL 386™ PROCESSOR

PRODUCT	SPEED (MHz)	I/O PINS	SERIAL PORTS	TIMERS/ CTRS	STATIC DESIGN	SYS MGT MODE	A20 GATE	ADD SPACE	DMA CHAN	WDT	CLK GEN	PWR OPTIONS	CHIP SELECT	INTERRUPT CTLR	DRAM REFRESH	INPUT LEVELS	VOLTAGE	PACKAGE	TEMP
INTEL386™ PROCESSOR FAMILY																			
80386SX	16, 20, 25, 33	0	NO	0	NO	NO	NO	16M	0	NO	NO	NO	0	NO	NO	TTL	5.0V	NG100	C
80386DX	16, 20, 25, 33	0	NO	0	NO	NO	NO	4G	0	NO	NO	NO	0	NO	NO	TTL	5.0V	A132, NG132	C
80386SXTA	25, 33, 40	0	NO	0	YES	NO	NO	16M	0	NO	NO	NO	0	NO	NO	TTL	5.0V	KU100	C, E
INTEL386™ INTEGRATED PROCESSOR FAMILY																			
80386EXTB	25	24	3	3	YES	YES	YES	64M	2	YES	NO	PD, I	8	YES (8259A)	YES	TTL	3.3V	KU132, FA144	E
80386EXTC	25	24	3	3	YES	YES	YES	64M	2	YES	NO	PD, I	8	YES (8259A)	YES	TTL	5.0V	KU132, FA144	E
80386EXTC	33	24	3	3	YES	YES	YES	64M	2	YES	NO	PD, I	8	YES (8259A)	YES	TTL	5.0V	KU132, FA144	E

INTEL® 186 PROCESSOR

PRODUCT	SPEED (MHz)	I/O PINS	SERIAL PORTS	TIMERS/ CTRS	STATIC DESIGN	SYS MGT MODE	A20 GATE	ADD SPACE	DMA CHAN	WDT	CLK GEN	PWR OPTIONS	CHIP SELECT	INTERRUPT CTLR	DRAM REFRESH	INPUT LEVELS	VOLTAGE	PACKAGE	TEMP
INTEL® STANDARD PRODUCT FAMILY																			
80C186XL/188XL	12, 20	0	NO	3	YES	NO	NO	1M	2	NO	YES	PS	13	YES	YES	TTL	5.0V	A68, N68, R68, S80, SB80	C, E
80C186XL/188XL	25	0	NO	3	YES	NO	NO	1M	2	NO	YES	PS ç	13	YES	YES	TTL	5.0V	A68, N68, R68, S80, SB80	C
INTEL® ENHANCED PRODUCT FAMILY																			
80C186EA/188EA	25	0	NO	3	YES	NO	NO	1M	2	NO	YES	PS, PD, I	13	YES	YES	CMOS	5.0V	N68, S80, SB80	C
80C186EA/188EA	13, 20	0	NO	3	YES	NO	NO	1M	2	NO	YES	PS, PD, I	13	YES	YES	CMOS	5.0V	N68, S80, SB80	E
80L186EA/188EA	13	0	NO	3	YES	NO	NO	1M	2	NO	YES	PS, PD, I	13	YES	YES	CMOS	3.0V	N68, S80, SB80	E
80C186EB/188EB	25	16	2	3	YES	NO	NO	1M	0	NO	YES	PD, I	10	YES	YES	CMOS	5.0V	N84, S80, SB80	C
80C186EB/188EB	13, 20	16	2	3	YES	NO	NO	1M	0	NO	YES	PD, I	10	YES	YES	CMOS	5.0V	N84, S80, SB80	E
80L186EB/188EB	16	16	2	3	YES	NO	NO	1M	0	NO	YES	PD, I	10	YES	YES	CMOS	3.3V	N84, S80, SB80	C
80L186EB/188EB	8.13	16	2	3	YES	NO	NO	1M	0	NO	YES	PD, I	10	YES	YES	CMOS	3.0V	N84, S80, SB80	E
80C186EC/188EC	25	22	2	3	YES	NO	NO	1M	4	YES	YES	PS, PD, I	10	YES (8259A)	YES	CMOS	5.0V	KU100, S100, SB100	C
80C186EC/188EC	13, 20	22	2	3	YES	NO	NO	1M	4	YES	YES	PS, PD, I	10	YES (8259A)	YES	CMOS	5.0V	KU100, S100, SB100	E
80L186EC/188EC	16	22	2	3	YES	NO	NO	1M	4	YES	YES	PS, PD, I	10	YES (8259A)	YES	CMOS	3.3V	KU100, S100, SB100	C
80L186EC/188EC	13	22	2	3	YES	NO	NO	1M	4	YES	YES	PS, PD, I	10	YES (82SgA)	YES	CMOS	3.0V	KU100, S100, SB100	E

¹Product is guaranteed to 20 MHz 4V

PACKAGING:

A = Ceramic Pin Grid Array (PGA), **KU** = Plastic Quad Flat Pack (PQFP), **R** = Ceramic Leadless Chip Carrier (LCC), **N** = Plastic Leaded Chip Carrier (PLCC), **NG** = Plastic Quad Flat Pack (PQFP), **S** = Quad Flat Pack (QFP-EIAJ), **SB** = Shrink Quad Flat Pack (SQFP-EIAJ), **FA** = Thin Quad Flat Pack (TQFP), **FC** = Shrink Quad Flat Pack with heat spreader (PQ2 PowerQuad)

	A	KU	R	N	NG	S	SB	FA	FC
Intel486™ Processor	168ld	196ld						176ld	208ld
Intel386™ Processor	132ld	132ld			100ld, 132ld (DX)			144ld	
186 Processor	68ld	100ld	68ld	68ld, 84ld (EB)		80ld, 100ld (EC)	80ld, 100ld (EC)		

Power Options: PD = Power Down, PS = Power Save, I = Idle

Temperature Ranges: (Degrees Centigrade) C = Commercial (0 to 70°C), E = Extended (-40 to 85°C).

MCS® 96 Microcontrollers

MCS® 96 MICROCONTROLLER LINECARD

PRODUCT	SPEED (MHz)	ROM/ OTPROM	REGISTER RAM	CODE RAM	I/O PINS	I/O TYPE	SERIAL PORTS	ANALOG INPUT CHANNELS	ADDRESS SPACE	PKG	TEMP	KEY FEATURES
HSIO FAMILY												
8XC196KB16	16	8K	232	NO	48	HSIO	1	8	64K	N-68, S-80	C, E, A	Low cost entry level, suitable for replacing NMOS 8X9X
8XC196KC20	20	16K	488	NO	48	HSIO	1	8	64K	N-68, S-80, SB-80	C, E, A	16K OTPROM, 488 Byte RAM 3-PWM, PTS
8XC196KD/ 8XC196KD20	16, 20	32K	1000	NO	48	HSIO	1	8	64K	N-68, S-80, SB-80	C, E, A	32K OTPROM, 1000-byte RAM Version of KC

Timer Counters = 2; Once Test Mode = Yes; Process = CMOS

MOTION CONTROL FAMILY

8XC196MC	16	16K	488	NO	53	8 EPA	PTS MODE	13	64K	N-84, S-80, U-64	E	PTS, PWM, 3-Phase Waveform Generator
8XC196MD	16	16K	488	NO	64	12 EPA	PTS MODE	14	64K	N-84, S-80	E	MC Enhancement with Frequency Generator
8XC196MH	16	32K	744	NO	52	6 EPA	2	8	64K	N-84, S-80, U-64	E	Enhanced 3-Phase Waveform Generator with 32K EPROM

Timer Counters = 2; Once Test Mode = Yes; Process = CMOS

EPA FAMILY

87C196CA	16	32K	1000	256	44	6 EPA	2	6	64K	N-68	E	Integrated CAN 2.0 controller
87C196CB	16	56K	1.5K	512	56	10 EPA	2	8	1M	N-84	E	Integrated CAN 2.0, 1MB linear address range, 2K RAM
8XC196NP	25	4K	1000	NO	32	4 EPA	1	0	1MB	S-100, SB-100	C	1MB Linear Address Range, Low Power, 6 Chip select, 3 PWMs, Demux bus
8XL196NP	14	4K	1000	NO	32	4 EPA	1	0	1MB	S-100, SB-100,	C	3V at 14MHz version of 8XC196NP
8XC196NT	20	32K	1000	512	56	10 EPA	2	4	1MB	N-68	C, E	High performance and highly integrated controller with 1MB Address Range
80C196NU	40, 50	0	1000	NO	33, 32	4 EPA	1	0	1MB	S-100, SB-100	C	1MB Linear Address Range, 6 Chip Selects, 3 PWMs, Demux bus
80C196EA	40	0	1K	3K	83	17 EPA	3	16	2M	S-160	C	Highly integrated NU-core Controller with Serial Debug Unit

Timer Counters = 2, except 83C196EA = 4; Once Test Mode = Yes; Process = CMOS

MCS® 296 MICROPROCESSOR LINECARD

PRODUCT	SPEED (MHz)	ROM/ OTPROM	REGISTER RAM	CODE RAM	I/O PINS	I/O TYPE	SERIAL PORTS	ANALOG INPUT CHANNELS	ADDRESS SPACE	PKG	TEMP	KEY FEATURES
MCS 296 MICROPROCESSOR LINECARD												
80296SA	40, 50	0	512	2K	32	4 EPA	1	0	6M	S-100	C	6 MB Linear Address Range, 6 Chip selects, 3 PWM, 40-bit Hardware Accumulator

Timer Counters = 2; Once Test Mode = Yes; Process = CMOS

82527 CAN STANDALONE LINECARD

PRODUCT	CAN VERSION	I/O PORTS	BIT RATE	MESSAGE OBJECTS	GLOBAL MASK	PROGRAM CLOCKOUT	CPU INTERFACE	PACKAGE	TEMPERATURE
82527	2	Two 8-Bit Ports	Up to 1Mbit	14 (one with programmable mask)	Yes	Yes	8-Bit MUX 16-Bit MUX 8-Bit Non-MUX (sync/async)	44ld PLCC	E

Package Options: N-52 = 52L PLCC, N-68 = 68LD PLCC, N-84 = 84LD PLCC, S-100 = 100L QFP, SB-100 = 100L SQFP
Temperature Ranges: C = Commercial (0 to 70° C), E = Extended (-40 to 85° C), A = Automotive (-40 to 125°C).

AUTOMOTIVE MICROPROCESSOR/CONTROLLER LINECARD

PRODUCT	SPEED (MHz)	ROM/ OTPROM	REGISTER RAM	CODE RAM	I/O PINS	I/O TYPE	SERIAL PORTS	ANALOG INPUT CHANNELS	ADDRESS SPACE	PKG	TEMP	KEY FEATURES
87C196JR	16, 20	16K	488	256	41	EPA	2	6	64K	N-52	A	
87C196JT	16, 20	32K	1K	512	41	EPA	2	6	64K	N-52	A	
87C196JV	20	48K	1.5K	512	41	EPA	2	6	64K	N-52	A	
87C196KC	16	16K	488	0	48	HSIO	1	8	64K	N-68	A	
87C196KD	16, 20	32K	1K	0	48	HSIO	1	8	64K	N-68	A	
87C196KR	16	16K	488	256	56	EPA	2	8	64K	N-68	A	
87C196KT	18	32K	1K	512	41	EPA	2	8	64K	N-68	A	
87C196CA	16, 18	32K	1K	256	38	EPA	2	6	64K	N-68	A	CAN 2.0
87C196CB	16, 20	56K	1.5K	512	56	EPA	2	8	1M	N-84	A	CAN 2.0, Extended Addressing
87C54	16	16K	256	0	32	HSIO	1	0	64K	N-44	A	
87C51FA	16	8K	256	0	32	HSIO	1	0	64K	N-44	A	
87C51FB	16	16K	256	0	32	HSIO	1	0	64K	N-44	A	
87C51FC	16, 20	32K	256	0	32	HSIO	1	0	64K	N-44	A	

PRODUCT	CAN VERSION	I/O PORTS	BIT RATE	MESSAGE OBJECTS	GLOBAL MASK	PROGRAM CLOKOUT	CPU INTERFACE	PKG	TEMP
82527	2	Two 8-Bit Ports, QROM	Up to 1 M bit	14 (one with programmable mask)	Yes	Yes	8-Bit MUX, 16-Bit MUX, 8-Bit Non-MUX (Sync/Async)	N-44, S-40	A

Package Options: N-44 = 44LD PLCC, N-52 = 52LD PLCC, N-68 = 68LD PLCC, N-84 = 84LD PLCC, S-40 = 40LD QFP
Temperature Ranges: A = Automotive (-40 to 125°C).

MCS® 251 Microcontrollers

MCS® 251 MICROCONTROLLER LINECARD

PRODUCT	ROM/ EPROM (BYTES)	REGISTER RAM (BYTES)	TIMER/ COUNTERS	SERIAL PORT	ANALOG INPUT CHANNELS	I/O PINS	SPEED (MHz)	PROCESS	PACKAGE	SECURITY	TEMP	KEY FEATURES)
87C251SA	8K	1K	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SB	16K	1K	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SP	8K	512	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SQ	16K	512	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
83C251SA	8K	1K	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SA, ROM												
83C251SB	16K	1K	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SB, ROM												
83C251SP	8K	512	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SP, ROM												
83C251SQ	16K	512	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
87C251SQ, ROM												
80C251SB	ROMless	1K	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
80C251SQ	ROMless	512	3	1	0	32	16	CHMOS	P, N, TN, TP	L3	C, E	High Performance MCS® 251 Architecture, PCA, H/W WDT
83C251TA	8K	1K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	
83C251TB	16K	1K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	
83C251TP	8K	512K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	
83C251TQ	16K	512K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	
80C251TB	ROMless	1K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	
80C251TQ	ROMless	512K	3	2	0	32	24	CHMOS	P, N, TN, TP	L3	C, E	

MCS® 51 CLASSIC FAMILY MICROCONTROLLER LINECARD

PRODUCT	ROM/ EPROM (BYTES)	REGISTER RAM (BYTES)	TIMER/ COUNTERS	SERIAL PORT	ANALOG INPUT CHANNELS	I/O PINS	SPEED (MHz)	PROCESS	PACKAGE	SECURITY	TEMP	KEY FEATURES
80C31BH	ROMless	128	2	1	0	32	16, 24	CHMOS	D, N, P, S	N/A	C, E	Power Save Modes
80C51BH	4K ROM	128	2	1	0	32	12, 16, 24	CHMOS	N, P, S	P	C, E	Power Save Modes
87C51	4K EPROM/OTP	128	2	1	0	32	16, 24	CHMOS	D, N, P, S	L3	C, E	Three-Level Memory Lock
80C32	ROMless	256	3	1	0	32	16, 24	CHMOS	N, P, S	N/A	C, E	Up-Down Timer/Counter
80C52	8K ROM	256	3	1	0	32	12, 16, 24	CHMOS	N, P, S	L1	C, E	Up-Down Timer/Counter
87C52	8K EPROM/OTP	256	3	1	0	32	16, 24	CHMOS	D, N, P, S	L3	C, E	Up-Down Timer/Counter
80C54	16K ROM	256	3	1	0	32	12, 16, 24	CHMOS	N, P, S	L1	C, E	Up-Down Timer/Counter
87C54	16K EPROM/OTP	256	3	1	0	32	16, 24	CHMOS	D, N, P, S	L3	C, E, A	Up-Down Timer/Counter
87C58, ROM	32K ROM	256	3	1	0	32	12, 16, 24, 33	CHMOS	N, P, S	L1	C, E	Up-Down Timer/Counter
87C58	32K EPROM/OTP	256	3	1	0	32	16, 24, 33	CHMOS	D, N, P, S	L3	C, E	Up-Down Timer/Counter
80C51FA	ROMless	256	3	1	0	32	16, 24	CHMOS	D, N, P, S	N/A	C, E	Programmable Counter Array (PCA), Prog. Clock-Out
83C51FA	8K ROM	256	3	1	0	32	12, 16, 24	CHMOS	N, P, S	L1	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out
87C51FA	8K EPROM/OTP	256	3	1	0	32	16, 24, 33	CHMOS	D, N, P, S	L3	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out
87C51FB, ROM	16K ROM	256	3	1	0	32	12, 16, 24, 33	CHMOS	N, P, S	L1	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out
87C51FB	16K EPROM/OTP	256	3	1	0	32	16, 24, 33	CHMOS	D, N, P, S	L3	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out
87C51FC, ROM	32K ROM	256	3	1	0	32	12, 16, 24, 33	CHMOS	D, N, P, S	L1	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out
87C51FC	32K EPROM/OTP	256	3	1	0	32	16, 24, 33	CHMOS	D, N, P, S	L3	C, E, A	Programmable Counter Array (PCA), Prog. Clock-Out

MCS 51 EXPANDED RAM FAMILY LINECARD

PRODUCT	ROM/ EPROM (BYTES)	REGISTER RAM (BYTES)	TIMER/ COUNTERS	SERIAL PORT	ANALOG INPUT CHANNELS	I/O PINS	SPEED MHz	PROCESS	PACKAGE	SECURITY	TEMP	KEY FEATURES
80C51RA	ROMless	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	N/A	C, E	Expanded RAM, Prog. Clock out, H/W WDT
*83C51RA	8K ROM	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L1	C, E	Expanded RAM, Prog. Clock out, H/W WDT
87C51RA, ROM												
87C51RA	8K OTP	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L3	C, E	Expanded RAM, Prog. Clock out, H/W WDT
83C51RB	16K ROM	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L1	C, E	Expanded RAM, Prog. Clock out, H/W WDT
87C51RB, ROM												
87C51RB	16K OTP	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L3	C, E	Expanded RAM, Prog. Clock out, H/W WDT
83C51RC	32K ROM	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L1	C, E	Expanded RAM, Prog. Clock out, H/W WDT
87C51RC, ROM												
87C51RC	32K OTP	512	3	1	0	32	12, 16, 20, 24	CHMOS	N, P, S	L3	C, E	Expanded RAM, Prog. Clock out, H/W WDT

MCS 51 APPLICATION SPECIFIC FAMILY LINECARD

PRODUCT	ROM/ EPROM (BYTES)	REGISTER RAM (BYTES)	TIMER/ COUNTERS	SERIAL PORT	ANALOG INPUT CHANNELS	I/O PINS	SPEED MHz	PROCESS	PACKAGE	SECURITY	TEMP	KEY FEATURES
83C51KB	4K ROM	128	1	0	0	32	6	CHMOS	P	N/A	C	Integrated Resonator, Dedicated Scan IN/OUT Pins

Package Options: N = 44LD PLCC, P = 40LD PDIP, S = 44LD QFP (Quad Flat Pack), TN = 44LD PLCC at Express Temp. TP = 40LD PDIP at Express Temp.

Temperature Ranges: A = Automotive (-40 to 125°C).

Security: L1 = 1 Lock Bit, L2 = 2 Lock Bits, L3 = 3 Lock Bits, P = Protection

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